

**ASSESSMENT OF QUALITY OF CARE IN DIABETIC PATIENTS AMONG 35
YEARS AND ABOVE AGE GROUP RESIDING IN AN URBAN SLUM OF
NORTH CHENNAI –
A CROSS SECTIONAL STUDY**

DISSERTATION SUBMITTED TO
THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF **M.D. COMMUNITY MEDICINE BRANCH XV**



**THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY CHENNAI,
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MARCH 2008**

CERTIFICATE

This is to certify that this dissertation titled “**ASSESSMENT OF QUALITY OF CARE IN DIABETIC PATIENTS AMONG 35 YEARS AND ABOVE AGE GROUP RESIDING IN AN URBAN SLUM OF NORTH CHENNAI – A CROSS SECTIONAL STUDY**” is a bonafide work carried out by **Dr. A. BALAJI** in the Institute of Community Medicine, Madras Medical College, Chennai – 600 003, under my guidance and is being submitted to the Tamil Nadu Dr.M.G.R. Medical University in partial fulfillment of the requirements for the degree of **M.D. Branch XV – Community Medicine**.

Chennai Date:	DIRECTOR Institute of Community Medicine Madras Medical College, Chennai – 600 003. DEAN Madras Medical College, Chennai – 600 003.
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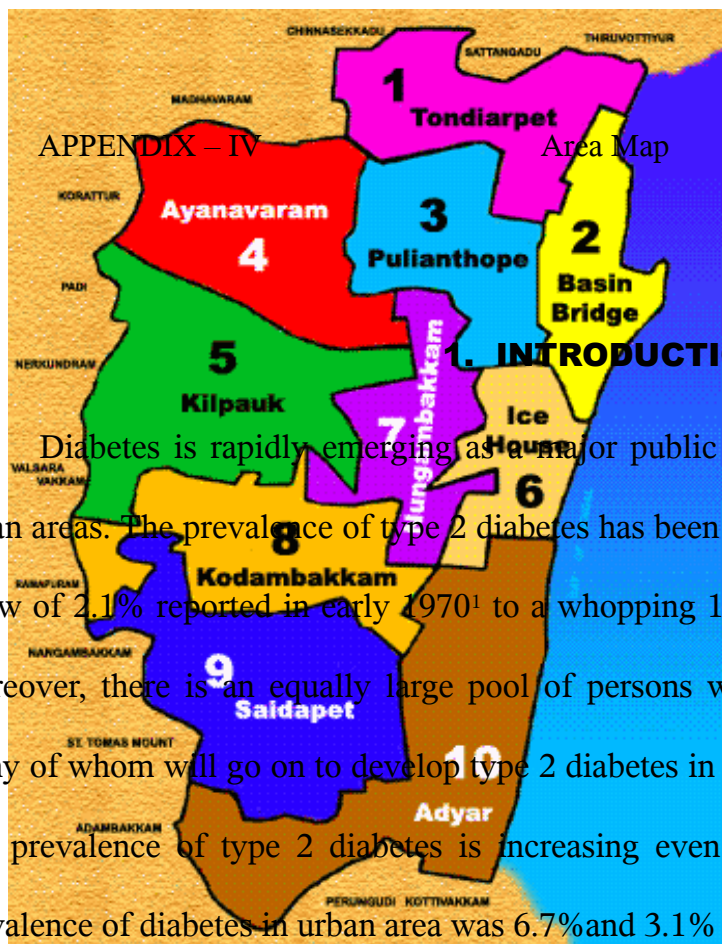
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1. INTRODUCTION

Diabetes is rapidly emerging as a major public health problem in India, especially in urban areas. The prevalence of type 2 diabetes has been steadily increasing in urban areas from a low of 2.1% reported in early 1970¹ to a whopping 11.6%² in 1996, in the adult population. Moreover, there is an equally large pool of persons with IGT (impaired glucose tolerance), many of whom will go on to develop type 2 diabetes in the future. There is evidence to suggest that prevalence of type 2 diabetes is increasing even in rural areas³. The national data on prevalence of diabetes in urban area was 6.7% and 3.1% in rural area as per 2003-04 data⁴.

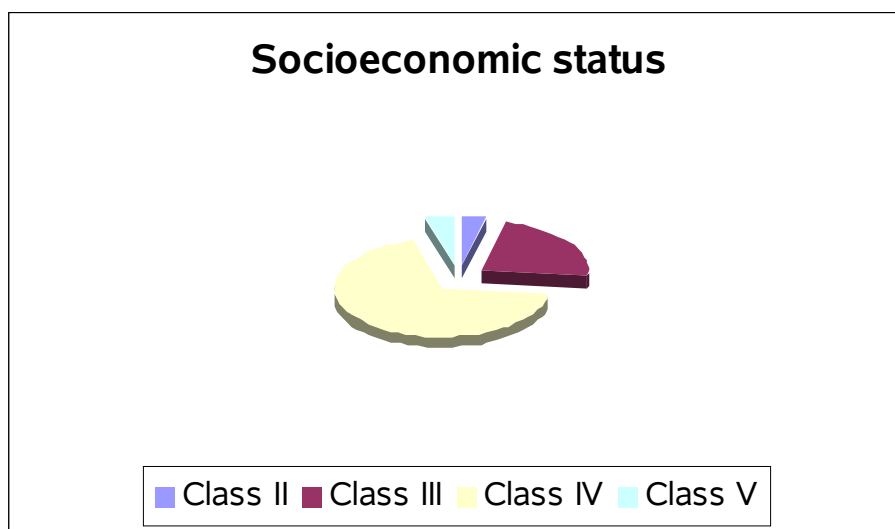
The rapid increase in population, increased longevity and high ethnic susceptibility to diabetes, coupled with rapid urbanization and changes from traditional lifestyles, will most likely trigger a diabetes epidemic⁵. Moreover, type 2 diabetes amongst Indians is being increasingly seen in younger, less obese persons than reported in the west. Health care delivery in India is provided either by doctors in the health centers, clinics, district, municipal and tertiary teaching hospitals run by the central and state governments; or through private general practitioners, specialists in their clinics, nursing homes or large corporate hospitals. The quality and cost of care varies considerably from place to place, depending on the available resources, training and interest in diabetes of the treating doctor and the patients' ability to pay for it. Generally, care provided in government institutions is free or at low subsidized cost. These institutions are crowded, ill equipped, and have scant resources. The quality of care suffers in this setting. Due to the scant and limited resources, the system is geared towards care of acute pressing illness with virtually no infrastructure for chronic diseases like diabetes. Those seeking medical care in the private sector pay for everything on their own as there is limited or no

reimbursements. This is a unique situation where the capacity to pay determines quality of medical care which indirectly affects long-term prognosis.

The prevailing poverty, ignorance, illiteracy and poor health consciousness further adds to the problem. Patients can access any level of care (primary, secondary or tertiary) based on close location, knowledge of its existence and resources. Thus many sociological factors determine long-term outcome of illness. A study of these factors and their influence on the prognosis and outcome are necessary to tackle diabetes in the community. Previous studies by Kapur A et al^{6,7} have looked at perceptions and attitudes of persons with diabetes and of the diabetes care providers and their significance to proper diabetes care delivery. Diabetes education and awareness programmes are an integral and essential part of diabetes care.

There is now irrefutable evidence that diabetes education, awareness and improving motivation for self care, improves care, reduce complications and thus overall reduces economic costs of diabetes^{8,9}.

Despite the high prevalence, serious long term complications, and established evidence based guidelines for management, translation of practice recommendations to care is still deficient in developed and developing countries.



2. OBJECTIVES

1. To assess the quality of care in type 2 diabetic patients of age 35 years and above in an urban slum of North Chennai.
2. To identify the possible factors associated with quality of care in the above said age group.

3. JUSTIFICATION

It is projected that more than half of the Indian population will live in urban areas by 2020 and nearly one third of this urban population will be of urban slum dwellers. With the rise in the urban/rural population ratio in all regions, and growing prevalence of obesity among urban dwellers, diabetes will increasingly concentrate in urban areas. It is also known that the prevalence of diabetes is high among urban slum dwellers than rural community. Previously a disease of the middle aged and elderly, type 2 diabetes has recently escalated in all age groups and is now being seen in younger age groups¹⁰. This will have major implications with respect to health care needs and costs. It is also evident that annual economic burden of diabetes at individual, family and societal level is huge¹¹.

Addressing health problems of urban poor is must for overall development of the country. Since they are underserved and unreached by the health personnel, vulnerability for worsening of Diabetes and its complications cannot be overlooked. It is also evident from some prospective studies that good glycemic control, lipid control, blood pressure control by providing good quality of care, protects against complications of type 2 diabetes¹². Age limit was chosen at 35 years as lower limit because type 1 diabetes was sometimes difficult to differentiate from type 2 diabetes in 20 to 35 years age group in this population (poor educational background and lack of medical records).

Even though there are many studies done on quality of care in developed countries, few studies exist in our country. The factors associated with quality of care like race, socioeconomic status, ethnicity differs between areas and people¹³. Assessment of quality of

care in the community can help draw attention to the need for improving diabetes management and provide a benchmark for monitoring changes over time.

In view of above reasons, this study on quality of care was conducted in 35 years and above age group in Bakthavatchalam Colony in division 36, under zone III of Chennai Corporation.

4. REVIEW OF LITERATURE

DIABETES AND IMPACT ON HEALTH STATUS

All patients with diabetes have normal age related changes that have the potential to reduce physiological reserve capacity. Diabetes affects most organ systems and cells in the body, and its ability to compromise physiological function must not be underestimated. Diabetes may accelerate the otherwise normal age related processes, further reducing functional capacity and physiological reserve. According to a WHO study there are about 5 times as many deaths indirectly attributes to diabetes¹⁴. It is seen that diabetes directly responsible for 9% of AMI, 4% of stroke, 2% of neuropathy, 32% cataract¹⁵. Diabetes shortens the average life expectancy by upto 15 years by virtually affecting every part of the system. Overall life expectancy in the diabetic patient is reduced by 25%. The causes of death differ in type1 and type 2 diabetes. In type 1 diabetes, most deaths are due to nephropathy (55%) and in type 2 diabetes cardiovascular diseases (58%) and stroke¹⁶.

Clearly, attention to proper glucose control can go a long way to slow or even prevent end-organ and cellular changes that may make age related changes more significant and problematic than would otherwise be the case, if age was the only factor influencing physiological parameters. Disease specific complications can greatly impair function and, when coupled with other age related changes, greatly affect elderly patients ability to independently conduct basic and individual activities of daily living and interfere with self-care and disease management.

DIABETES AND FINANCIAL CONCERNS

Because most of the expenditure on diabetes care result from its chronic complications,

programs designed to increase the early diagnosis and proper management of diabetes are suggested as ways of reducing both direct and indirect costs. Data from national surveys reported that direct costs accounted for 47% of the total expense, with indirect costs estimated at 53%. Indirect costs include short term morbidity, long term disability, and premature mortality.

Diabetes must be recognized early and dealt with effectively if we are to maximize quality and quantity of life, both of which are costs that need to be considered. The annual inpatient costs per patient with diabetes was \$7,150, compared with \$1,220 for people without diabetes. The corresponding averages for annual outpatient costs were \$1,225 and \$330, respectively¹⁷. In India, it is estimated that the average expenditure per patient per year would be a minimum of Rupees. 4,500¹⁸.

Care of type 2 diabetes patients depends on various factors

- 1) Family income
- 2) Family size
- 3) Educational status
- 4) Duration of diabetes
- 5) Family history of diabetes
- 6) Body mass index
- 7) Institutional care

- 8) Primary care physician knowledge
- 9) Choice of treatment (individualized treatment)
- 10) Availability of resources
- 11) Older age and female sex
- 12) Patients habits and activities (like smoking and alcoholism, physical inactivity)
- 13) Co-morbid conditions
- 14) Compliance to drugs
- 15) Patient education on diabetes
- 16) Ethnicity
- 17) Frequent changing of physicians for seeking of care
- 18) Use of alternative medicines

AGE, SEX, ETHNICITY, RACE AND DIABETES CARE

There are studies to show the significant differences of care between sex and ethnic groups. Population based survey among 53,000 diabetic patients in UK have shown that compared with areas of low ethnicity those from areas of high ethnicity were less likely to have received good quality of care. Women were less likely to have records of body mass index, pulse, BP, testing for microalbuminuria, serum cholesterol estimation¹⁹. Females received poor quality of care compared to males in this study.

In a meta analysis of 51 studies conducted in US and UK to determine ethnic difference, Blacks and Hispanics in the US and Asians in the UK have an increased risk of end stage renal disease, and Blacks and Hispanics in the US have an increased risk of retinopathy. Intermediate outcomes of care were worse in blacks, and they were inclined to be worse in Hispanics. Likewise, ethnic differences in quality of care in the US exist: process of care was worse in blacks²⁰.

There were controversies regarding diabetes care and age group. Data from 2160 randomly selected patients with diabetes were extracted from the manual medical records of a nationwide sample of 48 randomly selected health centers in Tunisia. The mean age of the study population was 62.4 years and mean duration of the disease was 8.4 years. Health centers with younger patients and increased availability of medication were independently and significantly associated with improved outcome of care scores²¹ ($P < 0.05$). In another study done in USA among older Americans and Alaska natives the quality of care varied by age group with significantly lower rates seen among the youngest and oldest²².

The study on the status of diabetes control in Asia shown that, the majority (55%) had HbA1c values exceeding 8%, indicative of poor glycemic control. Mean HbA1c of Diabetic populations in Indonesia, Korea, Taiwan were significantly lower (all $P = 0.0001$) while that of China, India, Vietnam was significantly higher than grand mean²³. This shows poor quality of care among diabetic population living in China, India and Vietnam.

SOCIOECONOMIC STATUS, EDUCATIONAL STATUS AND DIABETES CARE

In developing countries like India, family income and family size will determine the

educational status of the individual. There are inequalities in achievement of quality indicators among economically deprived people. The lower income group predicted poorer care²⁴.

A six center cohort study of diabetes in managed care setting in USA among 7456 adults enrolled in health plans participated in Translating Research Into Action for Diabetes (TRIAD Study) showed that the main socioeconomic difference was lower rates of quality of care among poorer and less educated individuals²⁵.

In a community-based survey (N=792) done at Delhi, college education and higher income are associated with improved quality of care. This survey was done aiming at exploring the difference of quality of care among middle and high-income groups²⁶.

PHYSICIAN KNOWLEDGE AND DIABETES CARE

There is also a lack of awareness among the Physicians about the existing interventions for preventing diabetes and the management of complications. A survey was conducted among 104 physicians in Karachi, Pakistan, with a stated interest in diabetes care. A brief case history of a patient with uncontrolled hyperglycemia (A1c 9.6%), blood pressure 150/90 mmHg, LDL Cholesterol 132 mg/dl, loss of vibration sense and background of diabetic retinopathy was described. Physicians were asked what further investigations they would order and were instructed to write a simple prescription for this patient. Only 47(45%) requested urine examination. Insulin therapy was selected by only 55(52.8%) respondents, and, of these, only 18(32.7%) could write an acceptable initiating regime for therapy. The Aspirin therapy was suggested by only 39(37.5%) physicians. This survey among Physicians in Karachi treating middle and upper income populations describes inadequacies of current Physician knowledge

in managing the diabetes patients²⁷.

Frequent change of Physicians with the hope of complete cure of Diabetes and use of alternative medicines for complete cure can influence quality of care²⁸. Other factors have also been stated by some diabetologists wise, duration of diabetes, family history, associated co morbid conditions and patients habits (like smoking and alcoholism) can influence quality of care²⁹.

Table - 1

ASSESSING CONTROL IN DIABETES³⁰

INDICATORS	MAIN CLINICAL USE
Urine glucose	Crude index of blood glucose, last resort in type 2 diabetes
Fasting blood glucose	Correlated with mean daily blood glucose levels
Glycated hemoglobin	Glycemic control over preceding 1 to 3 months
Glycated serum protein	Glycemic control over preceding 2 weeks
Urine ketones	Insulin deficiency and residual beta cell function in type 2 diabetes
LDL Cholesterol/Triglycerides	Cardiovascular risk factor
Annual Electro cardiogram, Blood pressure recording	Cardio vascular risk factor
Urine albumin	To assess early renal complications
Foot and Eye examination	To assess neuropathy and retinopathy

MANAGEMENT PLAN TO ACHIEVE QUALITY OF CARE INDICATORS

The aims of treatment are (a) to maintain the blood glucose levels as close within the normal limits as is practicable (b) to maintain ideal body weight. Treatment is based on (a) diet alone-small balanced meals more frequently, (b) diet and oral anti-diabetic drugs, or (c) diet and insulin³¹. The management plan should be formulated as an individualized therapeutic alliance among the patient and the family, the physician, and other members of the health care. In developing the plan, consideration should be given to the patient's age, work schedule and conditions, physical activity, eating patterns, social situation and personality, cultural factors, and presence of complications of diabetes, or other medical conditions. Implementation of the management plan requires that each aspect is understood and agreed by the patient and the care providers and that the goals and the treatment plan are reasonable. Any plan should recognize diabetes self-management education (DSME) as an integral component of care. Medical Nutrition Therapy follows this (MNT), which involves dietary advice, behavioural changes, and Pharmacological interventions³².

1. Self-Management Education

2. Medical Nutrition Therapy

IMPORTANCE OF DIABETES SELF-MANAGEMENT EDUCATION

For the patient with the chronic disease, education about the disease is a lifelong process and an opportunity to improve self-care techniques and to recognize the onset of complications. Access to diabetes educational materials on the Internet is increasing, and providing advice about the most reliable sites for information can be an important part of the educational process. Care must be taken not to overwhelm the patient with a surfeit of information.

Patients with type 2 diabetes are taught about the nutritional program and weight control. It is important for patients to realize that the loss of even small amounts of weight can be very beneficial for overall glucose control. By individualizing therapy and building on a solid foundation of basic skills acquired by the patient, the physician is in a unique position to guide the patient toward improved control³³.

OUTCOMES OF DIABETES SELF- MANAGEMENT EDUCATION³⁴

- Improves well being and quality of life
- Improves self care management
- Improves metabolic control
- Enhances the prevention and early detection of complications
- Decreases the costs of care
- Protects against malpractice

SCIENTIFIC EVIDENCE OF ANTIHYPERGLYCEMIC AGENTS ON THE CONTROL OF QUALITY OF CARE INDICATORS

There were many prospective long-term studies showing the efficacy of pharmacological interventions in maintaining the desired glycemic control and thereby reducing diabetes related complications.

The study done in Japan involved small number of patients (N=110) with type 2 diabetes who were non obese. Over a 6 yr period of follow up, it was shown that intensive

insulin therapy, achieving a mean HbA1c of 7.1% significantly reduced micro vascular complications compared with conventional insulin therapy with mean HbA1c value of 9.4%³⁵.

The Veterans Administrative cooperative study involved 153 obese men monitored for a period of 27 months. Intensive insulin treatment resulted in mean HbA1c 7.2% compared to conventional insulin therapy 9.5%³⁶.

In United Kingdom Prospective Diabetes Study, (UKPDS Study) a total of 3867 patients aged 25 to 65 years with newly diagnosed diabetes were recruited between 1977 to 1991, and studied over 10 years. These patients were divided into conventional diet alone therapy, Intensive insulin or sulphonyl urea group. It appeared that glycemic control to levels of HbA1c 7% in intensive control group shows benefit in reducing total diabetes end points, including a 25% reduction in micro vascular disease as compared with HbA1c levels 7.9%³⁷. Among this, 758 patients received stepwise antihypertensive therapy and 390 patients were treated less intensively with anti-hypertensives. The mean lowering of blood pressure in two groups was 144/82 mmHg in first group and less intensive therapy group showed 154/87 mmHg. Lowering of blood pressure to moderate goals (144/82) reduced the risk of DM-related death, stroke, micro vascular end points, retinopathy, and heart failure³⁸. (Risk reductions between 32% and 56%)

The STENO-2 Study showed the efficacy of multi-factorial intervention in a study population of 160 diabetic patients with type 2 diabetes. The diabetic patients were divided into two groups, one with op care arm and another with intensive care (multi-factorial arm). After a mean follow up of 7.8 years at the steno diabetes center, the multi-factorial arm showed 50% reduction in cardiovascular events and rates of retinopathy and nephropathy were also lowered

by 63% and 62% respectively³⁹. These studies prove the value of metabolic control and emphasize the importance of (1) intensive glycemic control and (2) early diagnosis and strict blood pressure control in type 2 diabetes.

GOALS OF MEDICAL NUTRITION THERAPY IN TYPE 2 DIABETES

1. Attain and maintain optimal metabolic outcomes including

- ❖ Blood glucose levels as near normal as possible to safely prevent or reduce the risk of complications of diabetes.
- ❖ Optimum serum lipid profile to reduce the risk of macro vascular complications.
- ❖ Optimum Blood pressure levels that decrease the risk of macro vascular complications.

2. Prevent and treat chronic complications of diabetes by

- ❖ Modification of nutrient intake, and lifestyle for prevention and treatment of obesity, dyslipidemia, cardiovascular disease, hypertension, nephropathy.
- ❖ Improve Health through healthy food choices and physical activity⁴⁰.

5. METHODOLOGY

STUDY DESIGN

Cross sectional descriptive study

STUDY AREA

Study was conducted in Bakthavatchalam Colony an urban slum in division 36 under Zone 3 of Chennai Corporation in North Chennai. North Chennai was chosen because, the clusters of slums and poor socio-economic conditions are more prevalent.

STUDY PERIOD

From January 2007 to June 2007

STUDY POPULATION

Adult patients with type 2 diabetes of age between 35 years and above residing in an urban slum of North Chennai from zone 3.

INCLUSION CRITERIA

Adults 35 yrs and above diagnosed as type 2 diabetes at least one year before, from the date of survey and under treatment from any health care facility.

EXCLUSION CRITERIA

- ❖ Type 1 diabetes
- ❖ Gestational diabetes

- ❖ Inability to communicate due to mental illness or physical disability
- ❖ Cancer, renal, hepatic, or intestinal disease requiring continuous treatment or hospital admission.
- ❖ Self-medication without consulting physicians
- ❖ Type 2 diabetic patients without complete records.

SAMPLE SIZE CALCULATION

The sample size was calculated using the estimate of P as 20%. The estimate was derived from a study done in USA in which 20% of people received one lipid profile test in the last year⁴¹. Among the five indicators, lipid profile test was considered as a key indicator and its estimate was assumed for calculation.

$$N = \frac{1.96 \times 1.96 \times p \times q}{d \times d}$$

$$N = \frac{1.96 \times 1.96 \times 20 \times 80}{4 \times 4} = 384.16$$

Where 1.96 is the confidence interval

p = prevalence= 20%

q = 100-p = 80%

d = precision value (20% of prevalence) = 4

SAMPLING METHOD

For selecting 384 adults with type 2 diabetes, sampling was done with multi stage technique. There are three zones in North Chennai, out of which, zone 3 was selected by simple random method. There were more than 100 slums in zone 3, out of which one slum was selected by simple random method in division 36. The selected slum had 32 streets, 2780 households with a population of 14,510. House to house survey was done everyday for 30 days. During household survey, every house was visited and enquired about patients with type 2 diabetes of 35 years and above age group and they were interviewed. If the house was locked at the time of survey, the same house was visited the next day. A total of 436 adults with diabetes were interviewed, out of which 26 were excluded for not having complete records and 10 were excluded for not having interest in giving information, inability to converse and chronic bedridden patients. A total of 400 study participants were included in this study after applying inclusion and exclusion criteria.

STUDY TOOL

- 1) A pre-tested questionnaire was administered to study participants.
- 2) Study participants were asked to show their records of lab test results, physician's prescription etc.

QUESTIONNAIRE (APPENDIX – I)

The questionnaire for this study was developed based on National Diabetes Quality

Improvement Alliance Performance Measurement Set for Adult Diabetes⁴², modified for our country with the help of the guide. It was pre-tested by a pilot study in an area similar to the study population not included in the study, necessary modifications were made and the final questionnaire was prepared. It was prepared in both Tamil and English. The final questionnaire consists of the following details,

Socio demographic profile of the subject: Age, sex, occupation, education, per capita income of the family

Diabetes status of the subject: Duration of diabetes and treatment, type of treatment, health care facility where they were seeking treatment for diabetes, compliance to treatment like regular intake of drugs and visit to primary care physicians, co morbid conditions or chronic medical illness other than diabetes etc

Behavioral data: Dietary habits, Physical exercise

Checking the records for Quality of care indicators

The patients records and particulars about the diagnosis for diabetes, treatment prescription and lab tests underwent were noted.

1. At least one HbA1c test in the last one year.
2. At least one lipid profile in the last one year.
3. At least one urine test for microalbuminuria in the last one year.
4. At least one dilated eye test in the last one year for retinopathy.

5. At least one-foot examination in the last one year for nephropathy.
6. At least one Fasting sugar test in the last 3 months⁴³.
7. Glycemic control measures- Recent HbA1c level and fasting sugar level
8. Lipid control measures- Recent LDL CH level

DATA COLLECTION

DIRECT INTERVIEW

After having sought permission from the Chennai Corporation Health Officer and the concerned Zonal Asst Health Officer, the data collection was started in the month of May. At the start of the interview, the purpose of the study was explained to the patient. After getting the oral informed consent, they were interviewed. The patients generally were friendly and forthcoming with information. During the interviews time was taken by the investigator to answer most of the doubts raised by the patients regarding diabetes. The records of the patients were asked and checked for the quality indicators.

DATA ENTRY AND ANALYSIS

Data entry was made in excel software in codes and Analysis was done with Epi-info 2002. The quality of diabetes care was measured as percentage of the five services delivered during the visit in the previous year. Results were expressed in percentage and associations with factors were tested for significance using Chi square test.

OPERATIONAL DEFINITIONS

Modified kuppusamy scale: Socio economic status was assessed using the above mentioned scale, which constitute the components of occupation, education and income of the head of the household. (*Appendix - II*)

Oral Hypoglycemic agents: Oral hypoglycemic agents are group of drugs given to diabetic patients for lowering the blood glucose levels and are effective orally.

Insulin: This is a hormone synthesized in the beta cells of the pancreatic islets, which has Blood glucose lowering action. This insulin is commercially prepared and used among Diabetics for controlling of blood glucose.

Alternative Medicines: Any indigenous group of medicines other than allopathic diabetic medicines consumed by the patients for control of blood sugar.

Tertiary care: All Govt medical colleges, private medical colleges, multispeciality hospitals, corporate hospitals are included as tertiary care, which are specially equipped in managing diabetic complications.

Private General Practitioners: The medical doctors completed MBBS/MD who are practicing and treating diabetic patients.

Private specialty: Endocrinologists, Diabetologist who are specially trained in treating diabetic patients.

Corporation clinic: Patients seeking treatment in clinics, managed by Chennai Corporation, which are provided with drugs for treatment of diabetic patients.

Regular treatment: Drugs/Insulin consumed/injected by the patient, as per the dosage and timing schedule prescribed by the physicians without discontinuity

Regular Visit to primary care physicians: At least once in a month or once fortnightly visit to physicians by the patient for check ups and lab tests.

Glycated hemoglobin: Glucose in the blood is complexed to a certain fraction of hemoglobin to an extent proportional to the blood glucose concentration. The percentage of such glycosylated hemoglobin reflects the mean blood glucose levels during the red cell life time⁴⁴. (i.e., about the previous 2 to 3 months). The normal value of glycated hemoglobin ranges from 3.8 to 6.4% ⁴⁵

Dilated eye test: Any eye examination using a lighted device after putting pupil dilating eye drops (judged from name of the drops or whether it caused sensitivity to bright afterwards) within the last one year.

Foot examination: Any foot examination-using weights placed on the great toe, fork like vibration instrument, pin and hot or cold object.

Dietary advice or nutrition counseling: Any group or class or individual counseling on diet

for a minimum of 5 mins by dietician/nurse/doctor.

QUALITY OF CARE

Good: Patients were considered to have been received good quality of care if all the five necessary indicators were performed. In this study recent fasting sugar test estimated in the last 3 months was included as one of the process measure indicators.

The five necessary indicators are following:-

- 1) At least one Fasting sugar test in the last 3 months.
- 2) At least one lipid profile in the last one year
- 3) At least one urine test for microalbuminuria in the last one year.
- 4) At least one dilated eye test in the last one year for retinopathy.
- 5) At least one-foot examination in the last one year for nephropathy.

Poor: If any one of the indicators was not performed, patient was considered to have been received poor quality of care.

Glycemic control: A patient with recent HbA1c <7% and recent fasting sugar <120 mg/dl is considered to have good control. HbA1c >7% and recent fasting sugar >120 mg/dl is considered to have poor control⁴⁶.

Lipid control: Patients with recent LDL Cholesterol less than 130 mg/dl and more than 130 mg/dl are considered to have good control and poor control respectively.

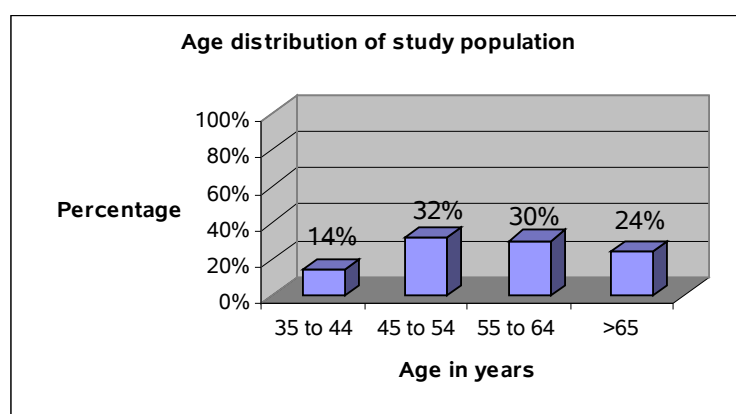
6. RESULTS

A total of 436 adults with diabetes were interviewed, out of which 26 were excluded for not having complete records and 10 were excluded for not having interest in giving information, inability to converse and chronic bedridden patients. A total of 400 study participants were studied in Bakthavatchalam Colony a urban slum of North Chennai, under zone 3 of Chennai Corporation. Total population of the slum was 14,150.

AGEWISE DISTRIBUTION OF THE ADULTS IN THE STUDY

32% of the adults were between 45 to 54 years and 30% were between 55 to 64 years. More than 65 years of age constitute 24% and 35 to 44 years constitute 14%. (Figure 1)

Figure 1



SEX DISTRIBUTION OF THE STUDY POPULATION

33% (132) of adults were males and 67% (268) of adults were females.

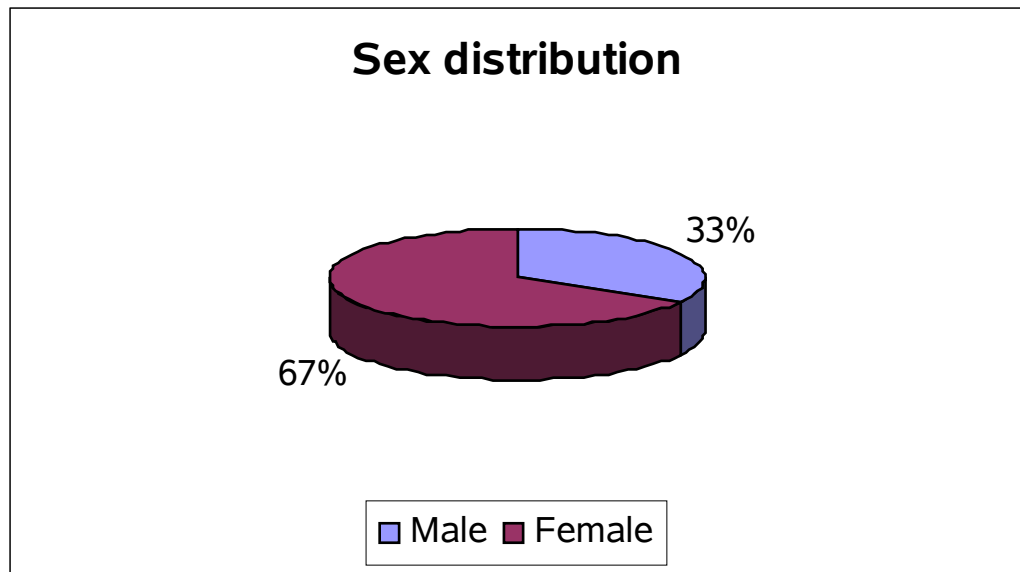
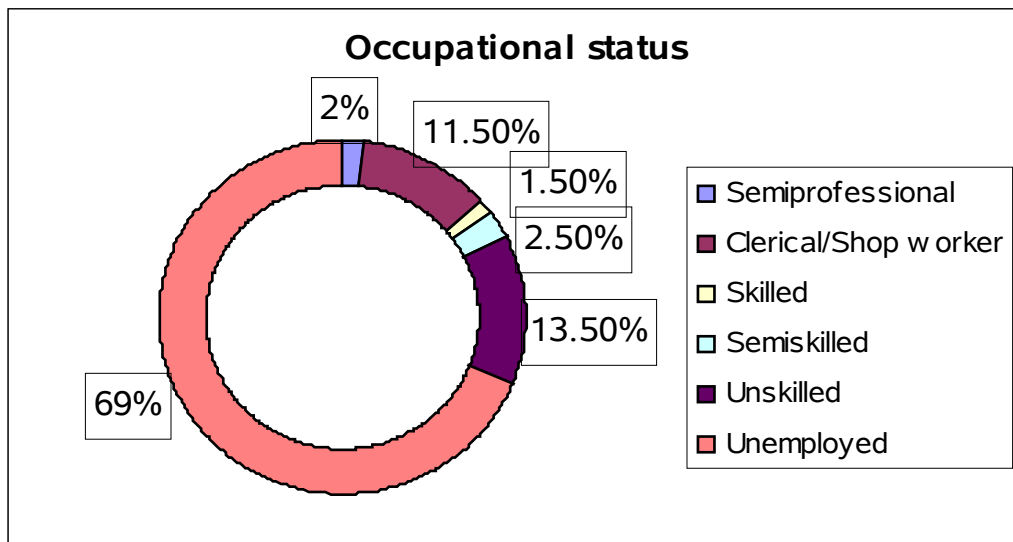


Figure 2

OCCUPATIONAL STATUS OF THE STUDY POPULATION

69% of the study population was unemployed and 11.5% of the population were clerical and shop workers. 13.5% of the people were unskilled workers. Since most of the females were housewives the proportion of the unemployed category was high. (Figure 3)

Figure 3



EDUCATIONAL STATUS OF THE STUDY POPULATION

9.1% of males and 31.3% of females were illiterate among the study population. The degree holders were 6.1% in males and 2.2% in females. (Table -2) According to a study of 900 people living in Chennai slums, conducted during 2006-07 by Tamil Nadu state Indian Medical Association revealed about 75% of adult women and 48.2% of adult men are illiterate⁴⁷.

Table - 2

Educational Status of the Study Population

Educational status	Male	Female
BA/BSc	8 (6.1%)	6 (2.2%)
Diploma	2 (1.5%)	0

High school	26 (19.7%)	18 (6.7%)
Middle school	50 (37.9%)	68 (25.4%)
Primary school	34 (25.7%)	92 (34.4%)
Illiterate	12 (9.1%)	84 (31.3%)
Total	132 (100%)	268 (100%)

SOCIO ECONOMIC STATUS OF THE STUDY POPULATION

68.5% of the study population belonged to class IV (upper lower) and 23% belonged to class III (lower middle). Class II and Class V constitute 4 and 4.5% of the study population. No one belonged to class I. (Figure 4)

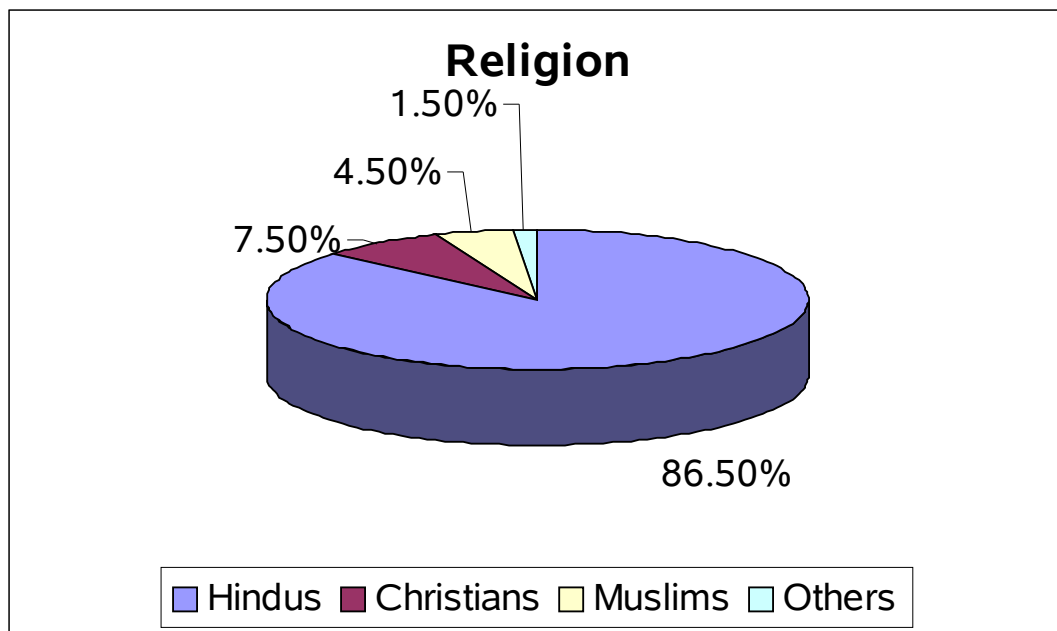
Figure 4



RELIGION

Hindus constitute 86.5% of the population, Christians constitute 7.5% and 4.5% were Muslims. (Figure 5)

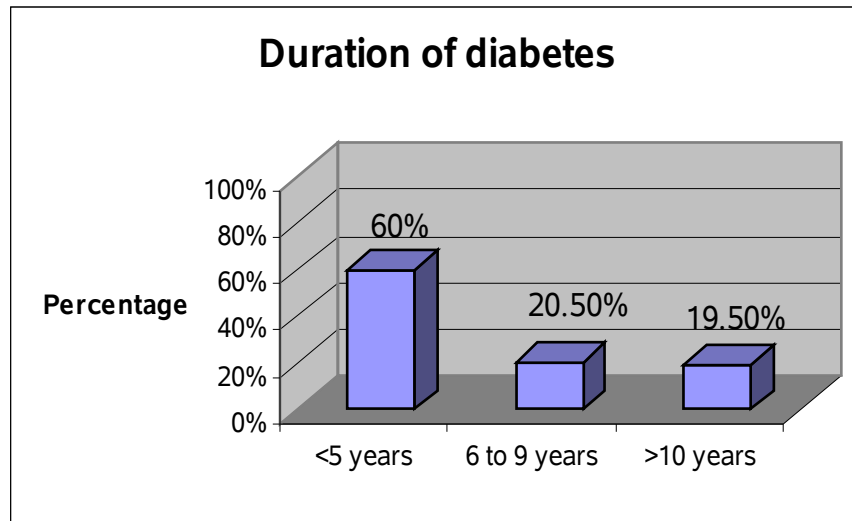
Figure 5



DURATION OF DIABETES AMONG STUDY POPULATION

Most of the study population had duration of diabetes between 1 to 5 years i.e., 60% (240). 20.5% (82) were having diabetes between 6 to 9 years and 19.5% (78) were having more than 10 years. (Figure 6)

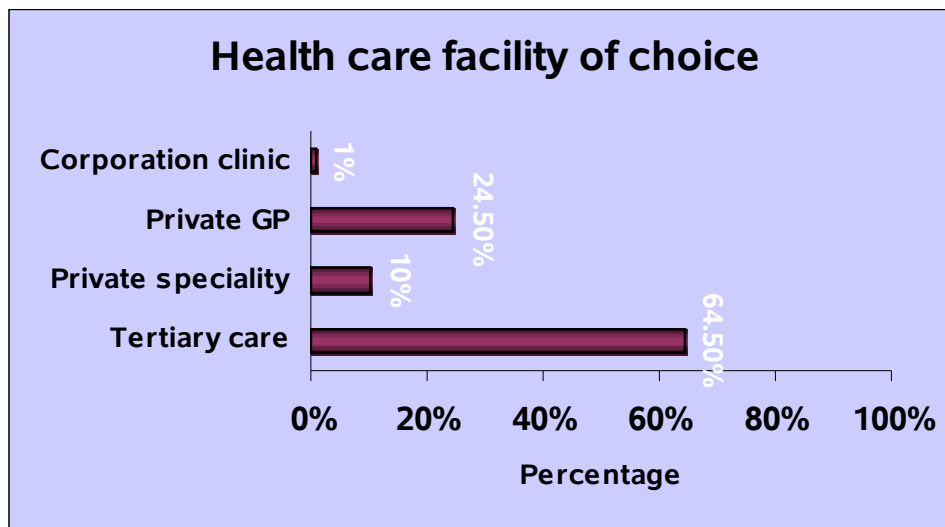
Figure 6



HEALTH CARE FACILITY OF CHOICE IN THE STUDY POPULATION

64.5% (258) of the study participants were seeking treatment in tertiary care, 24.5% (98) were seeking treatment in private general practitioners, the rest 10% (40) in private specialty and only 1% (4) in corporation clinic. (Figure 7)

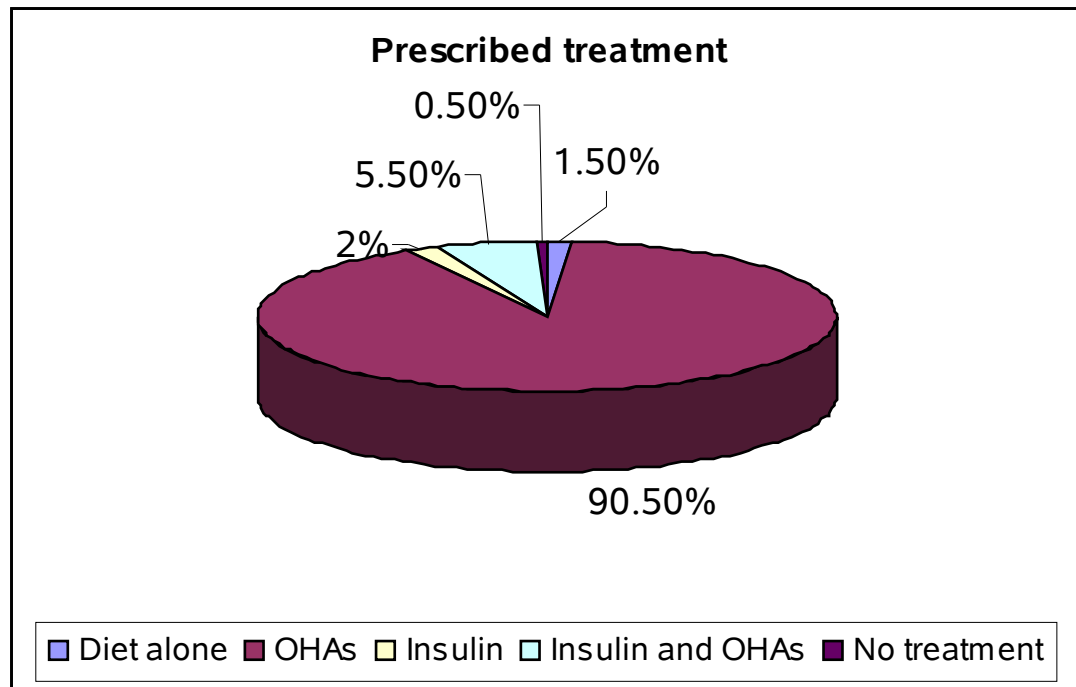
Figure 7



DISTRIBUTION ACCORDING TO PRESCRIPTION OF TREATMENT

90.5% (362) of the study participants were prescribed with Oral drugs and 5.5% (22) were prescribed with Insulin and Oral drugs. Diet alone and Insulin only categories constitute 1.5% and 2% respectively. 0.5% was not under treatment. (Figure 8)

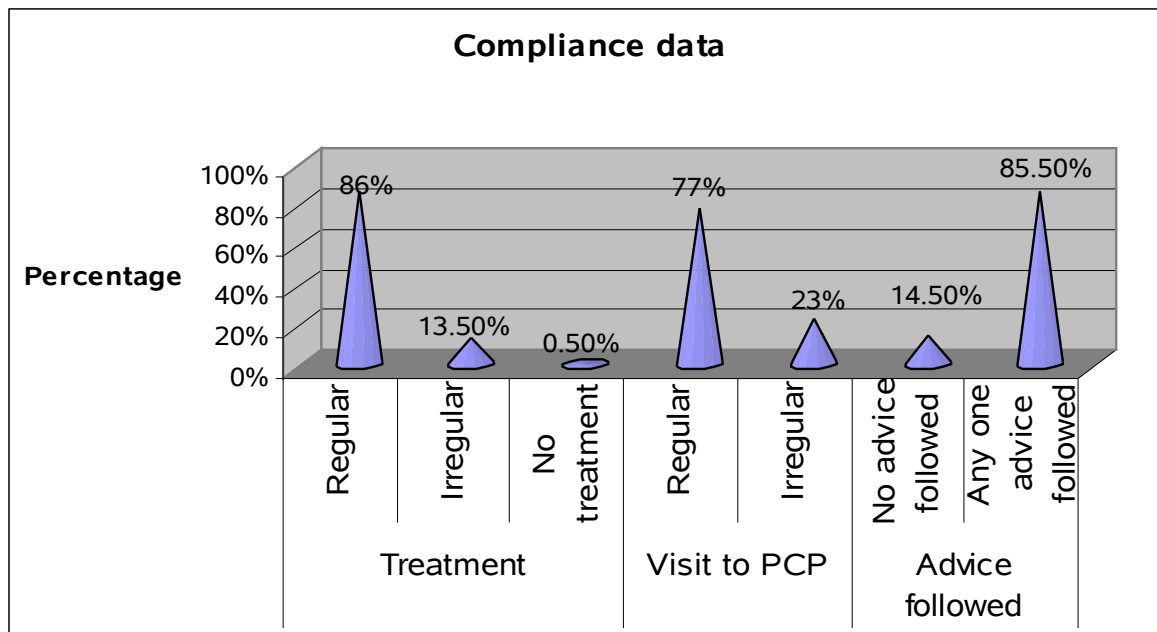
Figure 8



DISTRIBUTION OF DATA ON PATIENT COMPLIANCE TO TREATMENT, VISIT TO PRIAMRY CARE PHYSICIANS AND ADVICE FOLLOWED

86% (344) of the study population was following the treatment schedule regularly, 13.5% (54) were irregular in following the treatment schedule and 0.5% (2) were not under treatment. 77% (308) of the study population was visiting the primary care physicians regularly and 23% (92) were irregular in visiting the physicians. Patients who followed any one of the advice like dietary advice, physical exercise, smoking and alcohol cessation 85.5% (342) and who didn't follow any advice constitute 14.5%. (Figure 9)

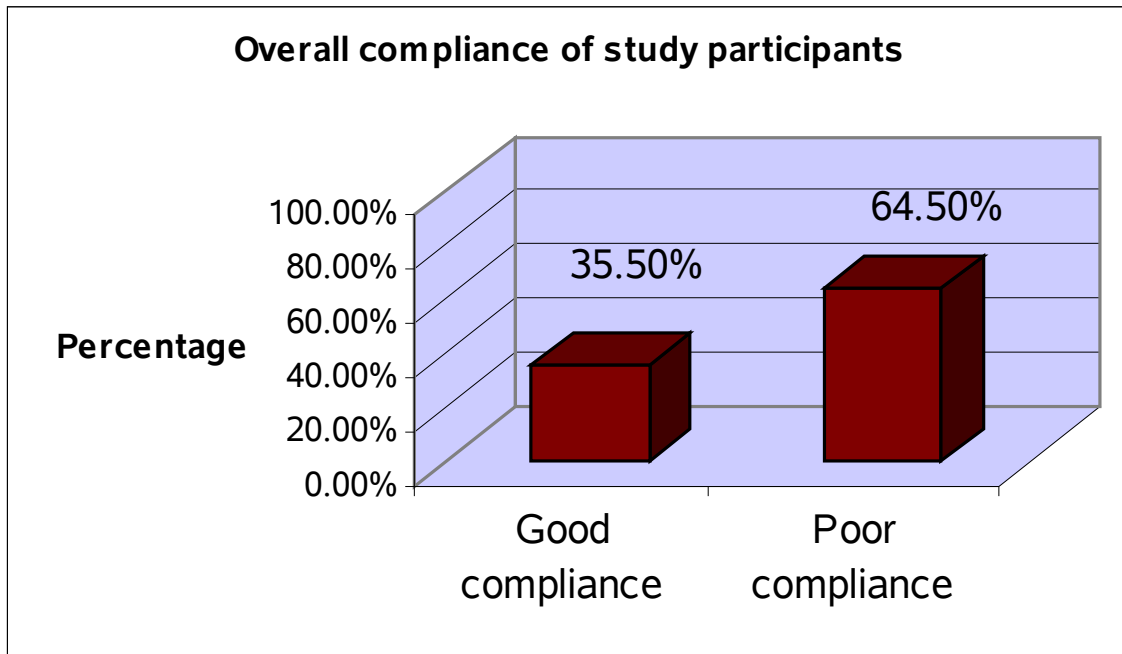
Figure 9



OVERALL COMPLIANCE OF THE STUDY POPULATION

Overall compliance was calculated using the study population who had followed all three advices (Regular treatment-1, Regular visit to physician-2, Any one advice followed-1) were given 3 scores, one for each advice. The adults with scores 3 were considered to have good compliance and 0,1,2 scores were considered to have poor compliance. The proportion of people with good compliance was 35.5% and poor compliance was 64.5%. (Figure 10) This was low when compared to a community-based study conducted in Delhi in which the compliance rate was 79.4%⁴⁸.

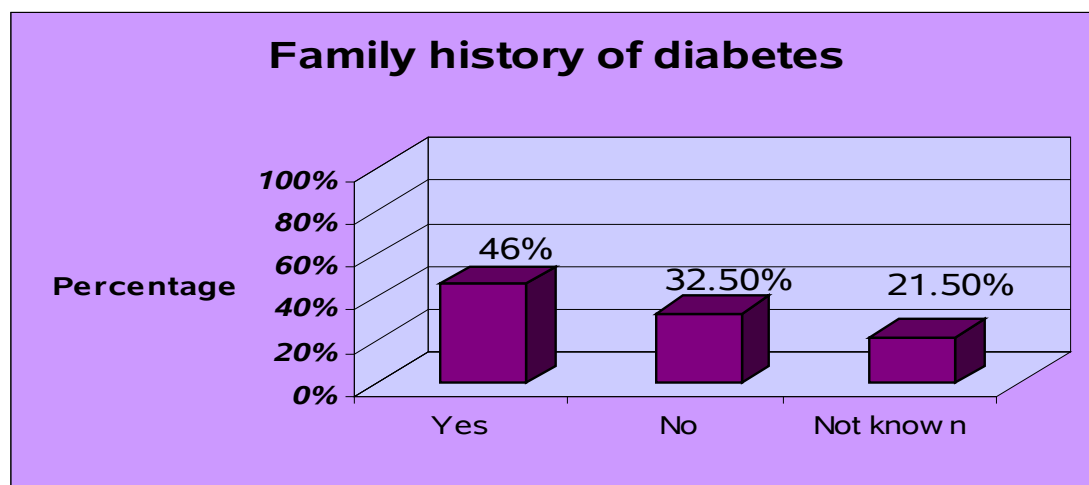
Figure 10



DISTRIBUTION OF FAMILY HISTORY OF DIABETES AMONG STUDY POPULATION

Among the study participants 46% (184) had family history of diabetes, 32.5% (130) didn't had family history and 21.5% of the patients were replied that they do not know the family history of diabetes. (Figure 11)

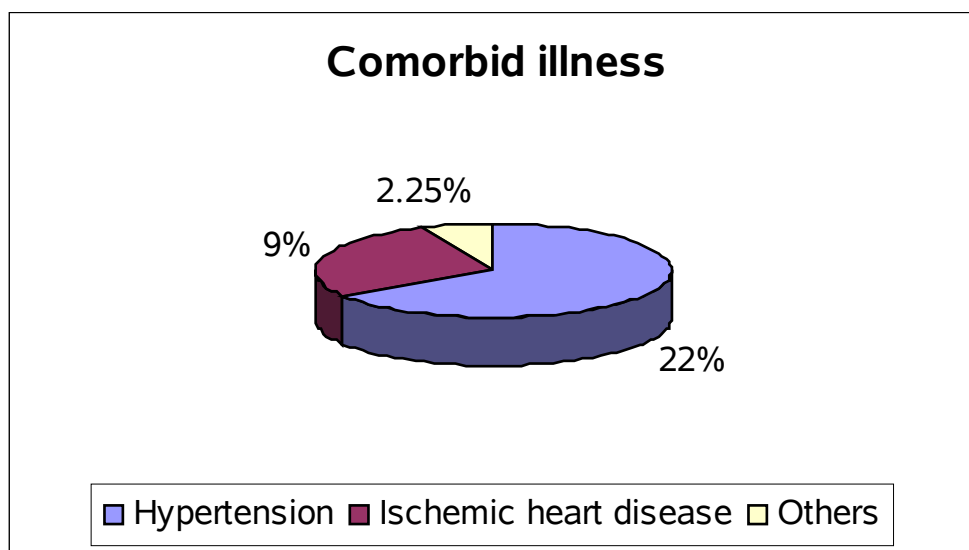
Figure 11



CO-MORBID ILLNESSES AMONG THE STUDY POPULATION

22% (88) of the study population was known systemic hypertensive patients, 9% (36) were known ischemic heart disease patients and the 2.25% had some other illnesses. (Figure 12)

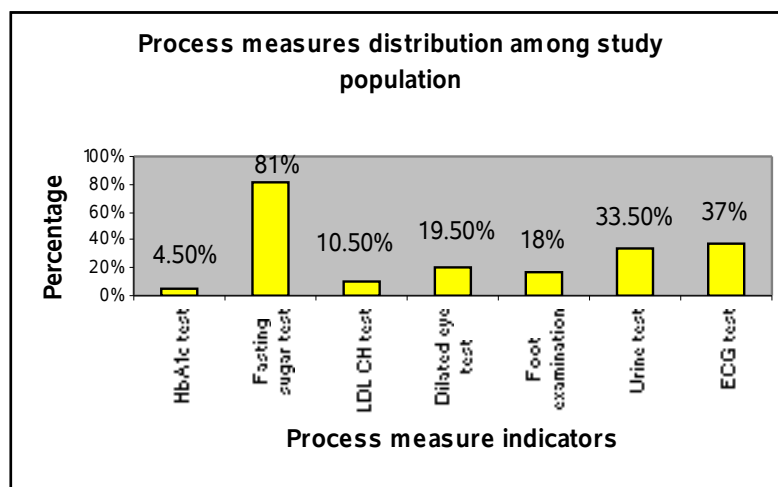
Figure 12



QUALITY OF CARE INDICATORS ESTIMATED AMONG THE STUDY POPULATION

Among the study participants the proportion of people who had undergone the tests for blood sugar i.e. one HbA1c test in the last one-year and Fasting sugar test in the last 3 months were 4.5% and 81%. The other constituents were 10.5% underwent LDL-CH estimation, 19.5% underwent dilated eye examination, 18% underwent foot examination, 33.5% underwent urine test for microalbuminuria and 37% underwent ECG test. (Figure 13) According to a community-based study done at Bangalore among 611 diabetic subjects the people who underwent lipid test, eye examination, foot examination, ECG test, Urine albumin test and Fasting sugar test were 7.7%, 18%, 11.9%, 20.6%, 13.1%, and 96.4% respectively⁴⁹.

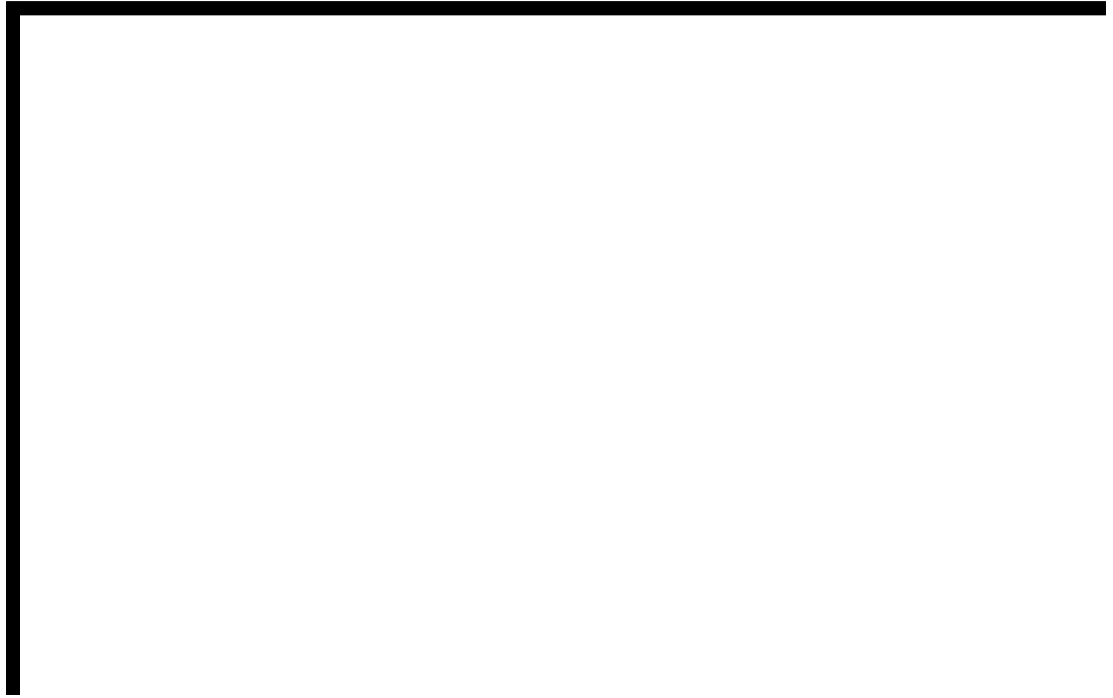
Figure 13



DISTRIBUTION OF CONTROL OF OUTCOME INDICATORS

The proportion of people with good glycemic control (<120 mg/dl) and Lipid control (<130 mg/dl) were 43.8% and 52.4%. (Figure 14) Since LDL CH estimated proportion was low, it seems that LDL CH had good control rather than sugar control. This was comparable to a study done in Houston among 822 diabetic patients showed 40.5% had good glycemic control and 43.7% had good lipid control⁵⁰.

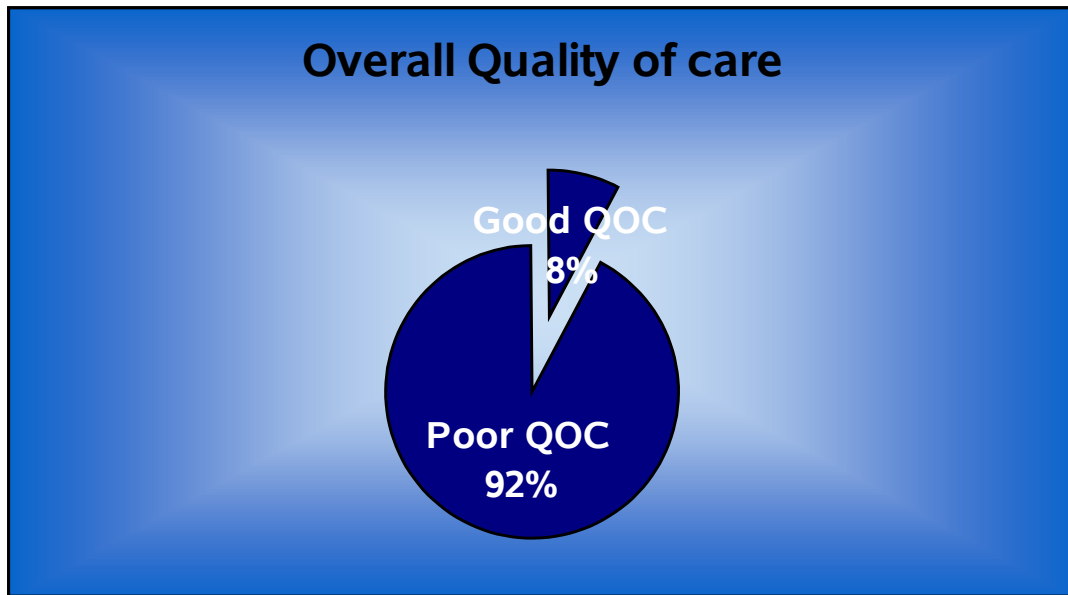
Figure 14



DISTRIBUTION OF QUALITY OF CARE AMONG THE STUDY POPULATION

The quality of diabetes care was measured as the percentage of the five following services delivered during the visit in the previous year. 1. Fasting sugar test in the last 3 months 2. Lipid profile 3. Urine test for microalbuminuria 4. Dilated eye examination 5. Foot examination. Those who received all the five services were considered to have good quality of care. Those patients with less than 5 services received were considered to have poor quality of care. In this study only 8% were received good quality of care. (Figure 15)

Figure 15



7. ANALYSIS

AGE VS QUALITY OF CARE

68.8% of the adults in the 35 to age group had good quality of care and 31.2% of the >65 age group had good quality of care. Statistically there is no significant difference between quality of care among two age groups. (Table-3)

Table - 3

Age Vs Quality of Care

Age group	Good QOC	Poor QOC	Total
35 to 64	22 (68.8%)	282 (76.6%)	304
>65	10 (31.2%)	86 (23.4%)	96
Total	32 (100%)	368 (100%)	400

Chi square value = 0.73 df = 1 P value > 0.1 Not significant

SEX VS QUALITY OF CARE

62.5% of males and 37.5% of females received good quality of care. Whether this difference was true which was tested by chi-square. There was significant difference of quality of care among males and females. Males received good quality of care than females in this study. (Table -4)

Table - 4

Sex Vs Quality of Care

Sex	Good QOC	Poor QOC	Total
Male	20 (62.5%)	114 (31%)	134
Female	12 (37.5%)	254 (69%)	266
Total	32 (100%)	368 (100%)	400

Chi-square = 12.2 df = 1 P value < 0.001 Highly significant

OCCUPATION VS QUALITY OF CARE

When the occupational status was grouped and compared there was no significant difference between quality of care. As per this study quality of care was not dependent upon the occupation of the patient. (Table -5)

Table - 5

Occupation Vs Quality of Care

Occupation	Good QOC	Poor QOC	Total
Clerical	4 (12.5%)	50 (13.6%)	54
Unskilled	2 (6.25%)	68 (18.5%)	70
Unemployed	26 (81.25)	250 (67.9%)	276
Total	32 (100%)	368 (100%)	400

Chi-square = 2.85 df = 2 P value > 0.1 Not significant (With Yates correction)

EDUCATIONAL STATUS VS QUALITY OF CARE

43.75% of the people studied up to middle school received good quality of care. 87% of the people who studied some schooling (primary, middle, high) received good quality of care.

Quality of care was significantly associated with educational status. (Table -6)

Table - 6

Educational Status Vs Quality of Care

Education status	Good QOC	Poor QOC	Total
BA/BSc (Degree)	2 (6.25%)	12 (3.28%)	14
High school	8 (25%)	36 (9.84%)	42
Middle school	14 (43.75%)	102 (27.87)	116
Primary school	6 (18.75%)	122 (33.33%)	128
Illiterate	2 (6.25%)	94 (25.68%)	96
Total	32 (100%)	366 (100%)	398

Chi-square = 11.78

df = 4

P value = 0.02 significant

SOCIO ECONOMIC STATUS VS QUALITY OF CARE

Quality of care was high among class III (lower middle) i.e. 56.25% and low among class IV i.e. 31.25%. There was highly significant relation shown between quality of care and socio economic status. (Table-7)

Table – 7

Socio-economic Status Vs Quality of Care

Socio economic class	Good QOC	Poor QOC	Total
Class II	4 (12.5%)	12 (3.5%)	16
Class III	18 (56.25%)	74 (21.2%)	92
Class IV	10 (31.25%)	264(75.3%)	274
Total	32 (100%)	350 (100%)	382

Chi-square = 26.42 df = 2 P value <0.001 Highly significant (With Yates correction)

RELIGION VS QUALITY OF CARE

Quality of care was high among Hindus (68.75%) and low among Christians (9.38%). There was highly significant relation shown between quality of care and religion. Hindus had good quality of care than other religion people in this study. (Table -8)

Table – 8

Religion Vs Quality of Care

Religion	Good QOC	Poor QOC	Total
Hindus	22 (68.75%)	324 (88.04%)	346
Muslims	6 (18.75%)	12 (3.28%)	18
Christians	3 (9.38%)	27 (7.33%)	30
Others	1 (3.12%)	5 (1.35%)	6
Total	32 (100%)	368 (100%)	400

Chi square = 22.8 df = 3 P value < 0.001 Highly significant

DURATION OF DIABETES VS QUALITY OF CARE

Patients with lesser duration of diabetes seems to have good quality of care when compared to patients with longer duration of diabetes. There was no statistical difference between quality of care when it was compared with patients with duration of diabetes. (Table -9)

Table – 9

Duration of Diabetes Vs Quality of Care

Duration of diabetes	Good QOC	Poor QOC	Total
1 to 5 years	16 (50%)	224 (60.8%)	240
6 to 9 years	10 (31.25%)	72 (19.6%)	82
> 10 years	6 (18.75%)	72 (19.6%)	78
Total	32 (100%)	368 (100%)	400

Chi-square = 1.94

df = 2

P value > 0.1 Not significant

PRESCRIBED TREATMENT VS QUALITY OF CARE.

93.75% of adults received good quality of care when they were taking only oral Hypoglycemic Agents and the insulin category constituted only 6.25%. There was no statistical significant difference existed between these two groups based on quality of care. (Table -10).

Table – 10**Prescribed Treatment Vs Quality of Care**

Prescribed treatment	Good QOC	Poor QOC	Total
OHAs	30 (93.75%)	232 (92%)	262
OHAs and Insulin	2 (6.25%)	20 (8%)	22
Total	32 (100%)	252 (100%)	284

P value > 0.5 Not significant

HEALTH CARE FACILITY OF CHOICE VS QUALITY OF CARE

Quality of care was good among 50% of adults seeking treatment with physicians in private specialty hospital. There was highly significant difference shown between quality of care when compared to health care facility of choice by the patients. (Table -11)

Table - 11**Health Care facility of choice Vs Quality of Care**

Health care facility	Good QOC	Poor QOC	Total
Tertiary	10 (31.25%)	248 (68.1%)	258
Private specialty	16 (50%)	24 (6.6%)	40
Private GP	6 (18.75%)	92 (25.3%)	98
Total	32 (100%)	364 (100%)	396

Chi-square = 67.37 df = 2 P value < 0.0001 Highly significant

OVERALL COMPLIANCE VS QUALITY OF CARE

Patients with good overall compliance had good quality of care compared to patients with poor compliance. 68.8% had good quality of care with good compliance. There was highly significant difference shown between quality of care among two groups of compliance. (Table-12).

Table - 12

Overall Compliance Vs Quality of Care

Compliance	Good QOC	Poor QOC	Total
Good	22 (68.8%)	120 (32.6%)	142
Poor	10 (31.2%)	248 (67.4%)	258
Total	32 (100%)	368 (100%)	400

Chi-square = 18.19 df = 1 P value <0.0001 Highly significant

FAMILY HISTORY VS QUALITY OF CARE

Good quality of care was high among patients with positive family history of Diabetes. But there was no significant difference statistically when these two family history groups were compared based on quality of care. (Table 13)

Table - 13

Family History Vs Quality of Care

Family history	Good QOC	Poor QOC	Total
Present	14 (63.6%)	170 (58.2%)	184
Absent	8 (36.4%)	122 (41.8%)	130
Total	22 (100%)	292 (100%)	314

Chi-square = 0.2 df = 1 P value > 0.5 Not significant

COMORBID CONDITIONS VS QUALITY OF CARE

Quality of care was good among those patients with absence of co morbid illness. 62.5% of the adults had received good quality of care when they were not affected with other co morbid illnesses. There was no statistical significant difference between quality of care when two comorbid illness groups were compared. (Table 14)

Table -14

Comorbid Condiitons Vs Quality of Care

Co morbid conditions	Good QOC	Poor QOC	Total
Present	12 (37.5%)	174 (47.3%)	186
Absent	20 (62.5%)	194 (52.7%)	214
Total	32 (100%)	368 (100%)	400

Chi-square = 1.23 df = 1 P value >0.2 Not significant

8. DISCUSSION

This study is an attempt to make an assessment of the quality of diabetes care received by adults aged 35 years and above. It is community based descriptive cross sectional study where 400 adults of age 35 years and above were interviewed. While early detection of diabetes is important, it is essential to ensure that those detected receive good quality of care. Though the concept of care of diabetic patients is not new, the performance measurement set for measuring the quality of care in adult diabetes patients was developed and approved by January 2005 only.

National Diabetes Quality Improvement Alliance (NDQIA), a voluntary collaboration that now comprises most of the organizations throughout the world that are concerned about the care of diabetes patients. This collaboration has converged on a core list of measures that address the most important aspects of good diabetes care. The recently revised list of nine consensus measures, which have also gained widespread acceptance internationally, contains six indicators for care processes and three for outcomes of care. The NDQIA set was designed to evaluate the quality of care in managed care institutions. The same performance measurement set was modified to local situations and performed a community based study to explore a picture of health care sought and identify variations in quality of care in a community.

Quality of care was assessed by looking into how much proportion of patients with diabetes had received or estimated to have performed five process measure indicators. The relationship of quality of care received, with the socio-demographic factors was worked out. Chi-square test was employed to determine the extent to which socio-demographic factors; institutional care and other factors influence quality of diabetes care. This study revealed 81% of the study participants underwent recent fasting sugar test and only 4.5% underwent HbA1c

test estimation. This is comparable to a community-based study conducted in Puerto Rico in March 2006, where 93% had documented fasting glucose test and 9% had HbA1c test performed⁵¹.

The same community based study done in Delhi among middle and high-income groups documented 13% had undergone HbA1c test estimation in the last year⁵². Since our country is a developing country and this study focused on people in lower socio-economic conditions, recent fasting sugar estimation was considered as one of the indicators rather than HbA1c test. The proportion of adults who received other quality indicators in this study were 10.5% for LDL-CH estimation, 19.5% for dilated eye examination, 18% for foot examination, 33.5% for urine test and 37% for ECG test. The Delhi survey documented 16.2% underwent dilated eye examination, 32.1% underwent LDL-CH estimation test⁵³. A population based cross sectional survey of 2118 adults with self-reported diabetes in 22 states of USA documented only 61% had feet examination and dilated eye examination⁵⁴. The medical record review of 429 diabetic patients belonged to lower income group in North Carolina showed the estimation of indicators ranged from 80% for BP recording to 3.3% for complete foot examination⁵⁵. The proportion that underwent tests for various indicators varied widely in each study.

The same study done in hospital settings also documented considerable variations in diabetes management. According to a study conducted in USA in community health centers among 2865 diabetic adults showed 26% had documented dilated eye examination, 51% received foot care⁵⁶. Another study done during 2000-01 in a large urban public hospital in USA, revealed considerable variation in diabetes management provided by diabetic clinic doctors, resident doctors of internal medicine and faculty physicians of the same hospital⁵⁷.

These wide variations might be attributed to the lack of adherence to accepted standards of diabetes care by the practicing physicians. In the current study only 8% of patients received good quality of care, which is very low, nowhere closer to the acceptable standards. The study done in Texas, USA in 2004 among 211 diabetic patients from 20 primary care clinics, only 33% received all the five indicated services⁵⁸. Even in developed countries the acceptable standards of care was not reached yet.

The adults who received good quality of care in this study were male sex ($P < 0.001$), school education ($P = 0.02$) and middle class people ($P < 0.001$). Patients who preferred private specialty for treatment had received good quality of care ($P < 0.0001$), suggests that there is need to improve infrastructure in Govt. tertiary care hospitals. Majority of the study population were seeking treatment in Govt. tertiary care hospitals in this study. There was strong association ($P < 0.001$) found between quality of care and patient compliance to treatment. In this study quality of care was not associated with age, type of occupation, duration of diabetes, treatment prescribed, positive family history of diabetes and other presence of morbid illnesses. The Delhi based community survey among 792 subjects revealed the quality of care was associated with duration of diabetes ($P = 0.001$), institutional care ($P = 0.007$), income ($P = 0.002$), education ($P < 0.001$), use of OHAs (prescribed treatment) ($P = 0.002$), and compliance score ($P = 0.029$)⁵⁹. Another study done in USA in Alaska showed quality of diabetes care was associated with age group, with significantly lower rates of quality of care seen among the youngest and oldest. This study also revealed that patient diabetes education and duration of diabetes were strongly associated with quality of care, suggesting that the quality of care depends not only on the provider but also on the patient⁶⁰.

9. SUMMARY

The study done in urban slum of North Chennai in 35 years to 65 years age group patients with type 2 diabetes revealed 81% of the study population had undergone recent fasting sugar estimation and all other process measures estimation were done to a percentage of less than 30%, HbA1c estimation constituted only 4.5%. Urine test estimation and ECG test were done among 33.5% and 37% of the study population respectively. Among the study population 67% were females and 68.5% belonged to upper lower class.

Most of the people had diabetes 1 to 5 years duration i.e, 60% in the study. 64.5% of the study population was seeking treatment from tertiary care facility only. 86% of the people were taking treatment regularly and 77% were visiting the physicians regularly. Even though treatment and visit to the physicians were satisfactory, but the compliance scores were poor when all the three components (treatment, visit to pcp, advice followed) were added. The proportion of people with good compliance was 35.5% only. Among the study population 22% and 9% had known history of hypertension and ischemic heart disease. 46% of the study population had family history of diabetes. Overall quality of care was good among only 8% of the study population. The proportion of people underwent all the five indicated services were considered to have received good quality of care. Among the study population 43.8% had good glycemic control, 52.4% had good lipid control. In this study quality of care was associated with sex($p<0.001$), educational status($p=0.02$), socioeconomic status($p<0.001$), health care facility of choice($p<0.0001$), overall compliance($p<0.0001$).

This study indicates low compliance with diabetes care guidelines in underserved and

inconsistency of care according to demographic and health characteristics. According to this study the management of diabetes in our setting was sub optimal and even the minimum achievable goals for all diabetic patients were not reached. Rates of adherence to process measures of quality were relatively very low among this community, when compared with the targets established National Diabetes Quality Improvement Alliance.

10. CONCLUSION

The current study documents low compliance with diabetes care guidelines in underserved people and inconsistency of care according to socio demographic and health characteristics. Family income, Male sex, Education, Institutional care and treatment compliance are all independent predictors of various aspects of quality of diabetes care. Most of the factors explored in this study were comparable to other community and hospital based studies explained in the earlier. The poor quality of diabetes care documented in this study threatens a large fraction of the population with a risk of having diabetes related complications.

In conclusion, a wide gap exists between effective diabetes management practices and their implementation among middle and lower income group population. The study strengthens the case and patients, providers and other stakeholders for improving the quality of diabetes care.

11. RECOMMENDATIONS

The quality of care measures were well below the targets recommended by American Diabetes Association.

To improve the quality of care

- ❖ Proper and regular training of primary care physicians in the management of diabetes.
- ❖ Adherence to accepted standards of care for patients with diabetes.
- ❖ Need for quality improvement initiatives that enhance the level of care received by patients with diabetes particularly those most vulnerable to diabetes complications.
- ❖ DSME- Diabetes Self Management Education

The health care providers should properly teach DSME to the patients. It allows people with diabetes to take control of their condition, integrating their daily routine of self-monitoring and discipline into their lifestyle. This is achieved by regular conducting of patient education camps.

- ❖ A public health care delivery system is potentially important and has to be shifted gradually to a community basis implementation of regular and nationwide education programs on diabetes

12. LIMITATIONS

- ❖ The study is a cross sectional study and so the significance of relationship between quality of care and the factors associated with it should be considered with caution.
- ❖ The study is done in the slums of North Chennai alone. Ideally it should be evenly done all over the slums of the city.

BIBLIOGRAPHY

1. Ahuja MMS. Epidemiological studies on diabetes mellitus in India. In : Ahuja MMS (ed). Epidemiology of diabetes in developing countries. New Delhi: Interprint, 1979 : 29-38.
2. Ramachandran A, Snehlata C., NIDDM in India and Indian: Is it increasing? Bull IDF 1995; 40: 27-9
3. Ramaiya KL, Kodali VRR, Alberti KGMM. Epidemiology of diabetes in Asians of the Indian subcontinent. Diabetes Metab Rev 1990; 6: 125-46.
4. WHO India-ICMR, NCD RF surveillance 2003-04, Prevalence of Diabetes (self reported) by residence. Report of surveillance of risk factors of NCDs from five centers in India.
5. King H, Aubert Re, Herman WH. Global Burden of Diabetes, 1995-2025. Prevalence, numerical estimates and projection. Diabetes Care 1998; 21:1414-31.
6. Kapur A, Shishoo S, Ahuja MMS, Sen V, Mankame K. Diabetes Care in India Patients' Perceptions Attitudes and Practices (DIPPAP - 1 Study) Int.J.Diab. Dev.Countries 1997; 17 : 2-12.
7. Kapur A Shishoo S, Ahuja MMS, Sen V, Mankame K. Diabetes Care in India – Physicians' Perceptions Attitudes and Practices (DIPPAP - 1 Study) Int. J. Diab.Dev. Countries.
8. International Diabetes Federation. Lowering the price of ignorance. A Worldview on diabetes education Brussels 1995.
9. Carney T, Helliwell C. Effect of structured postgraduate medical education on the care of patients with diabetes, Brit J Gen. Pract. 1995; 45 : 149-51.
10. Mohan V et al., Prevalence of diabetes in Asian Indians. Diabetologia 2003, Volume 46; 1063 - 1070
11. Rayappa PH et al., International journal of diabetes developing countries, July-September 1990 (Int. J. Diab. Dev countries)
12. Harrison's text book of Internal Medicine, Volume II, 16th edition, Mc Graw-Hill Medical Publishing division. Chapter 323, Diabetes Mellitus Page 2163
13. Arleen F. Brown, MD PhD et al., Race, Ethnicity, Socioeconomic position and quality of care for adults with diabetes enrolled in managed care. The Translating Research into Action for Diabetes Study (TRIAD Study). Diabetes Care 28: 2864 – 2870, 2005.
14. Murray CJ, Lopez AD, Mortality by cause for eight regions of the world. Global Burden of Disease study. Lancet 1997 May 3; 349 (9061): 1267-76
15. Assessment of burden of non communicable diseases- Final report of Project WR/SE IND RPC 001 RB 02- SE/02/419575- ICMR, 2004
16. Handbook of Diabetes: Second edition, Gareth Williams, John C Pick up. Page 24, Public health aspects of diabetes

17. Diabetes spectrum journal. Volume 19. Number 4 – 2006.
18. Type 2 Diabetes, The Indian scenario – 2025? Type 2 DM – A Growing Menace in India.
Author: Prof. A. Ramachandran.
19. Julia Hipsley – Cox et al., Association of deprivation, ethnicity and sex with quality indicators for diabetes: Population based survey of 53000 patients in primary care. British Medical Journal:2004:329:1267-1269.
20. Loes C. Lanting, MSc, Inez M.A. Joung et al., Ethnic differences in mortality, End stage complications and quality of care among Diabetic patients. Diabetes care journal 28: 2280-2288, 2005.
21. Hugh Alberti et al., “Factors associated with the quality of care of patients with Diabetes: A study in primary care setting in Tunisia. Diabetes care published online ahead of print. May 16, 2007.
22. Yvette Roubideaux, et al., Measuring quality of diabetes care for older American Indians and Alaska Natives. American Journal of Public Health 94 (1): 60 – 66,2004.
23. Chaung LM, Tsai ST, Huang By, Tai Ty, The status of diabetes control in Asia – A cross sectional survey of 24317 patients with Diabetes Mellitus in 1998. DiabetMed – 2002 December: 19 (12): 978 – 985
24. Rayappa PH et al., The Impact of socioeconomic factors on diabetes care. Interenational Journal of Diabetes Developing countries, Volume 19; 7 – 15,1998
25. Arleen F Brown MD PhD et al., Race, Ethnicity, Socioeconomic position and quality of care for adults with diabetes enrolled in managed care. The Translating Research into Action for Diabetes Study (TRIAD Study). Diabetes Care 28 ; 2864 – 2870, 2005.
26. Jitendar Nagpal, MD and Abhishek Bhartia, ME. Quality of diabetes care in the middle and high income group populace. The Delhi Diabetes Community Survey (The DEDICOM survey). Diabetes care:29: 2341 - 2348, 2006
27. Jaweed Akhter, ABIM, FACP. Quality of diabetes care and management of Type 2 diabetes by general physicians in Karachi, Pakistan. Diabetes care, April 1, 2007 ; 30 (4):e27-e27.
28. Dr. G.C. Nayak M.D., D.M., Endocrinologist. Chapter. Common errors of in the management of Diabetes, page 106. Type 2 Diabetes, Indian Scenario 2025?
29. Dr. K.T. Paladi, Diabetologist. Chapter. Type 2 diabetes and its care, page 221. Type 2 Diabetes, Indian scenario 2025?
30. Hand book of diabetes: Second edition. Gareth Williams, John C. Pick up. Chapter, Assessing control in diabetes, page 68.
31. Park Text Book of Preventive and Social Medicine, 19th edition, Bhanot Publications, Feb 2007, Chapter – 6, Epidemiology of Chronic Non communicable diseases and

conditions. Page 331.

32. Diabetes care journal, Volume 29, supplement 1, January 2006. Management of diabetes. S8 and S9.
33. Ramachandran Coopan Chapter 34, General approach to the management of diabetes mellitus page 590. Joslin's Diabetes Mellitus 14th edition, Lippincott Williams and Wilkins publications. Author: C. Ronald Kahn, Gordon C. Weir.
34. Richard S. Beaser, Katie Weinger, Lisa M. Bolder – Bissell. Chapter 35, Education in the treatment of diabetes mellitus. Joslin's Diabetes Mellitus 14th edition, Lippincott Williams and Wilkins. Author: C. Ronald Kahn, Gordon C. Weir.
35. Schichiri M et al., Long term results of Kumamoto study on optimal diabetes control in type 2 diabetic patients. Diabetes care – 2000; 23 (supplement 2): B21. The Kumamoto study.
36. The Veterans Administrative Cooperative Study – CMDT, Current Medical Diagnosis and Treatment – 2007. International edition: page 1228.
37. Stralton IM et al., Association of glycemia with macro and micro vascular complications of type 2 diabetes (UKPDS 35) prospective observational study. British Medical Journal 321: 405 – 412, 2000.
38. Stralton IM et al., Association of systolic blood pressure with macro and micro vascular complications. (UKPDS 36) Prospective observational study. British Medical Journal 321: 412 – 419, 2000.
39. Gaede P et al., Multi factorial intervention and cardiovascular disease in patients with type 2 diabetes. New England Journal of Medicine 2003; 348 – 383.
40. American Diabetes Association, Complete guide to Diabetes, Second edition, Page 34. Author: Bruce R. Zimmerman, MD, Elizabeth A. Walker, CDE.
41. Baiju R. Shah et al., Deficiencies in the quality of diabetes care. Journal of General Internal Medicine Feb 22, 2007.
42. National Diabetes Quality Improvement Alliance Performance Measurement for Adult Diabetes (article online), 2005. Available from [http://www.nationaldiabetesalliance.org/Final 2005measures.pdf](http://www.nationaldiabetesalliance.org/Final%202005measures.pdf)
43. Davidson's Diabetes Mellitus Diagnosis and Treatment 5th edition, Saunders publications, Chapter 12, Diabetes self-management education – Biochemical indices of glycemic control, page 391, Table 12 – 4.
44. Park Text book of Preventive and Social Medicine, 19th edition, Bhanot Publications, Feb 2007. Chapter 6 – Epidemiology of Chronic Non Communicable Diseases and Conditions.
45. Harrison's Text Book of Internal Medicine, 16th edition, Mc Graw-Hill Medical

Publishing division, Appendices, Table A3 – Reference values for lab tests, Page A5.

46. Davidson Diabetes Mellitus Diagnosis and Treatment, 5th edition, Saunders Publications, Chapter 12 – Diabetes Self Management Education – Biochemical indices of glycemic control. Page-391, Table 12-4.
47. The Hindu, Monday September – 3- Issue, 2007, Volume 130, No 210, City edition Chennai, page number 1.
48. Jitendar Nagpal, MD and Abhishek Bhartia, ME. The Delhi Diabetes Community Survey (DEDICOM Survey). Quality of diabetes care in the middle and high income group population. Diabetes care: 29: 2341 – 2348, 2006
49. Rayappa P H et al., The Impact of socioeconomic factors on diabetes care. International Journal of Diabetes Developing countries, Jan-Mar issue, Volume 19, 1999.
50. Spann SJ et al., Management of type 2 diabetes patients in the primary care setting – A practice based research Network Study. Annals of family Medicine 2006 – Jan-Feb: 4 (1): 23 – 31.
51. Efrain Rodrigue – vigil MD, FACP et al., Quality of care provided to patients with Diabetes Mellitus in Puerto Rico – 2006. <http://www.medscape.com/view/articles/51834>.
52. Jitendar Nagpal, MD and Abhishek Bhartia, ME. The Delhi Diabetes Community Survey (DEDICOM Survey). Quality of diabetes care in the middle and high income group population. Diabetes care; 29; 2341 – 2348, 2006.
53. Jitendar Nagpal, MD and Abhishek Bhartia, ME. The Delhi Diabetes Community Survey (DEDICOM Survey). Quality of diabetes care in the middle and high income group population. Diabetes care: 29: 2341 – 2348, 2006
54. G.L. Beckles, MM Engelau et al., Population based assessment of level of care among adults with diabetes in USA. Diabetes care, Volume 21, Issue 9, 1998, 1432 – 1438.
55. Ronny A. Bell PhD, MS et al., Quality of Diabetes care among low income patients in North Carolina. American Journal of Preventive Medicine, Volume 21, Issue-2, August – 2001. Page 124 – 131.
56. A H Chin et al., Quality of Diabetes care in community Health Centers. American Journal of Public Health, March 2000, 90 (3), 431 – 434
57. Pittiporn Suwattee MD et al., Quality of care for diabetic patients in a large Urban public Hospital. Diabetes care: 26: 2003, 563 – 568.
58. Yvette Roubideaux, Dedra Buchwald et al., Measuring the quality of diabetes care for older American Indian and Alaska Natives. American journal of public health, 94 (1): 60 – 66, 2004.
59. Jitendar Nagpal, MD and Abhishek Bhartia, ME. The Delhi Diabetes Community

Survey (DEDICOM Survey). Quality of diabetes care in the middle and high-income group population. *Diabetes care*; 29; 2341 – 2348, 2006

60. Yvette Roubideaux, Dedra Buchwald et al., Measuring the quality of diabetes care for older American Indians and Alaska Natives. *American journal of public health* 94 (1); 60 – 66, 2004.

APPENDIX – I
QUESTIONNAIRE ON QUALITY OF CARE INDICATORS IN
DIABETES MELLITUS

Name:

Age:

Sex:

Occupation:

Educational status:

Monthly Income:

Religion:

DIABETIC STATUS:

- Are you a diabetic patient? Yes / No.
- How many years/months do you have diabetes?
- Are you undergoing any treatment?
No treatment, Diet alone, Diet and drugs, Diet and insulin.
- What is the health care facility are you seeking treatment?
Tertiary Private GP Private specialty Corporation clinic.
- Are you taking the treatment for diabetes regularly as prescribed by the physician? Yes / No.
- Are you consulting your physician regularly? Yes / No.
- Have you been counseled for the following?
Dietary advice Smoking cessation Alcohol cessation Physical exercise.
- Do you have any family history of diabetes? Yes / No / Unknown.
- Do you have any other co-morbid illness with diabetes? Yes / No.

CHECKING RECORDS FOR CARE INDICATORS

PROCESS INDICATORS

1. At least one or two HbA1c tests during previous year. Yes / No

2. At least one test for LDL Cholesterol during the previous year. Yes / No
3. At least one test for micro albuminuria during the previous year or evidence of medical attention for existing nephropathy.
4. At least one dilated eye examination for evaluation or diagnosis of retinopathy during the previous year.
5. At least one examination for neuropathy during the previous one year.
6. At least one ECG taken for cardiac evaluation during the previous year.
7. At least one fasting sugar test in the last 3 months.

OUTCOME INDICATORS

1. HbA1c level
 - < 7% - implies Good control
 - >7%% - implies Poor control
2. LDL – Cholesterol
 - < 130 mg/dl – implies Good control
 - > 130 mg/dl - implies Poor control
3. Recent Fasting sugar test
 - <120 mg/dl – implies Good control
 - > 120 mg/dl – implies poor control

QUESTIONNAIRE ON QUALITY OF CARE INDICATORS IN DIABETES MELLITUS

bgah; :

taJ :

ghy; :

bjhHpy; :

fy;tp jFjp :

khj tUkhdk; :

kjk; :

c';fSf;F rh;f;fiu tpahjp cs;sjh> Mk; - ,y;iy

vj;jid khj';fshf - tUl';fshf cs;sJ [[

rh;f;fiu tpahjpf;fhf vd;d khjphpahd kUj;Jtj;ij filgpof;fpwPh;fs;>

(m) VJk; ,y;iy

(M) cztl fl;Lg;ghL

(.) cztl fl;Lg;ghL kw;Wk; khj;jpiu

(<) cztl fl;Lg;ghL kw;Wk; ,d;Rypd;

c';fs; rh;f;fiu tpahjp kUj;Jt njitf;F v';F bry;fpwPh;fs;>

(m) khefuhl;rp fspdpf;

(M) jdpahh; bghJ kUj;Jth;

(.) jdpahh; rh;f;fiu tpahjp epg[zh;

(<) kUj;Jt fy;Y}hp kUj;Jtkid kw;Wk; bghJ kUj;Jtkid

rh;f;fiu tpahjpf;F kUj;Jthpd; ghpe;Jiuapd;go bjhlh;e;J rpfpr;ir bra;J bfhs;fpwPh;fsh>

(m) Mk;

(M) ,y;iy

c';fs; kUj;Jthplk; eP';fs; bjhlh;e;J Kiwahd Mnyhrid bgw;Wf;bfhs;fpwPh;fsh>

(m) Mk;

(M) ,y;iy

eP';fs; fPH;fz;ltw;wpw;F Mnyhrid bgw;Ws;sPh;fsh>

(m) cztl fl;Lg;ghL Mnyhrid

(M) kJ cz;zhik

(.) g[if gpog;gij epWj;Jjy;

(<) clw;gapw;rp

c';fs; FLk;gj;jpy; - cld; gpwe;jth;fspy; vtuDk; rh;f;fiu tpahjpahy; ghjpf;fg;gl;Ls;shh;fsh>

(m) Mk;

(M) ,y;iy

c';fSf;F ntnwDk; tpahjpfs; cs;sjh>
(m) Mk;
(M) ,y;iy

PROCESS INDICATORS

brd;w tUl;jjpy; HbA1C ghpnrhjid xU KiwnaDk; bra;ag;gl;ljh>

brd;w tUl;jjpy; ,uj;jj;jpy; LDL – Cholesterol – bfhGg;g[r;rj;J ghpnrhjid xU KiwnaDk;
bra;ag;gl;ljh>

brd;w tUl;jjpy; Microalbuminuria-fhd ghpnrhjid xU KiwnaDk; bra;ag;gl;ljh>

brd;w tUl;jjpy; Eye Examination / fz; ghpnrhjid xU KiwnaDk; bra;ag;gl;ljh>

brd;w tUl;jjpy; Neuropathy?f;fhd ghpnrhjid xU KiwnaDk; bra;ag;gl;ljh>

brd;w tUl;jjpy; khh;g[RUs; glk; xU KiwnaDk; vLf;fg;gl;ljh>

fle;j K;d;W khj';fspy; xU KiwnaDk; rhg;gpLk; Kd; rh;f;fiu ghpnrhjid (Fasting Sugar)
bra;ag;gl;ljh>

Outcome Indicators

HbA1C	<7%	ey;y fl;Lg;ghL
	>7%	fl;Lg;ghoy;iy
LDL – Cholesterol	<130 mg/dl	ey;y fl;Lg;ghL
	>130 mg/dl	fl;Lg;ghoy;iy
Fasting Sugar	< 120 mg/dl	ey;y fl;Lg;ghL
	>120mg/dl	fl;Lg;ghoy;iy

APPENDIX - II

Modified Kuppuswamy Scale

A. Education of Head of Household	Score
Professional/Postgraduate	7
B.A/B.Sc	6
Diploma/Post high school	5
High school	4
Middle school	3
Primary school	2
Illiterate	1
B. Occupation of Head of Household	
Professional	10
Semi-professional	6
Clerk/shop owner/farm owner	5
Skilled worker	4
Semi-skilled worker	3
Unskilled worker	2
Unemployed	1
C. Per capita income (Rs per month)	
>1828	12
913 to 1828	10
684 to 912	6
455 to 683	4
272 to 454	3
91 to 271	2
< 91	1

The Total Score indicates Socio-economic status as follows

26 to 29 – upper

16 to 25 – upper middle

11 to 15 – Lower middle

5 to 10 – Upper lower

Below 5- Lower

APPENDIX - III

DSME	:	Diabetes Self Management Education
ECG	:	Electro Cardio Gram
HbA1C	:	Glycosylated Haemoglobin
IGT	:	Impaired Glucose Tolerance
LDL – CH	:	Low Density Liprotein Cholesterol
MNT	:	Medical Nutrition Therapy
NDQIA	:	National Diabetes Quality Improvement Alliance
OHAs	:	Oral Hypoglycemic Agents
QOC	:	Quality of Care
TRIAD	:	Translating Research into Action for Diabetes

APPENDIX - IV

ZONAL MAP OF CHENNAI CORPORATION

